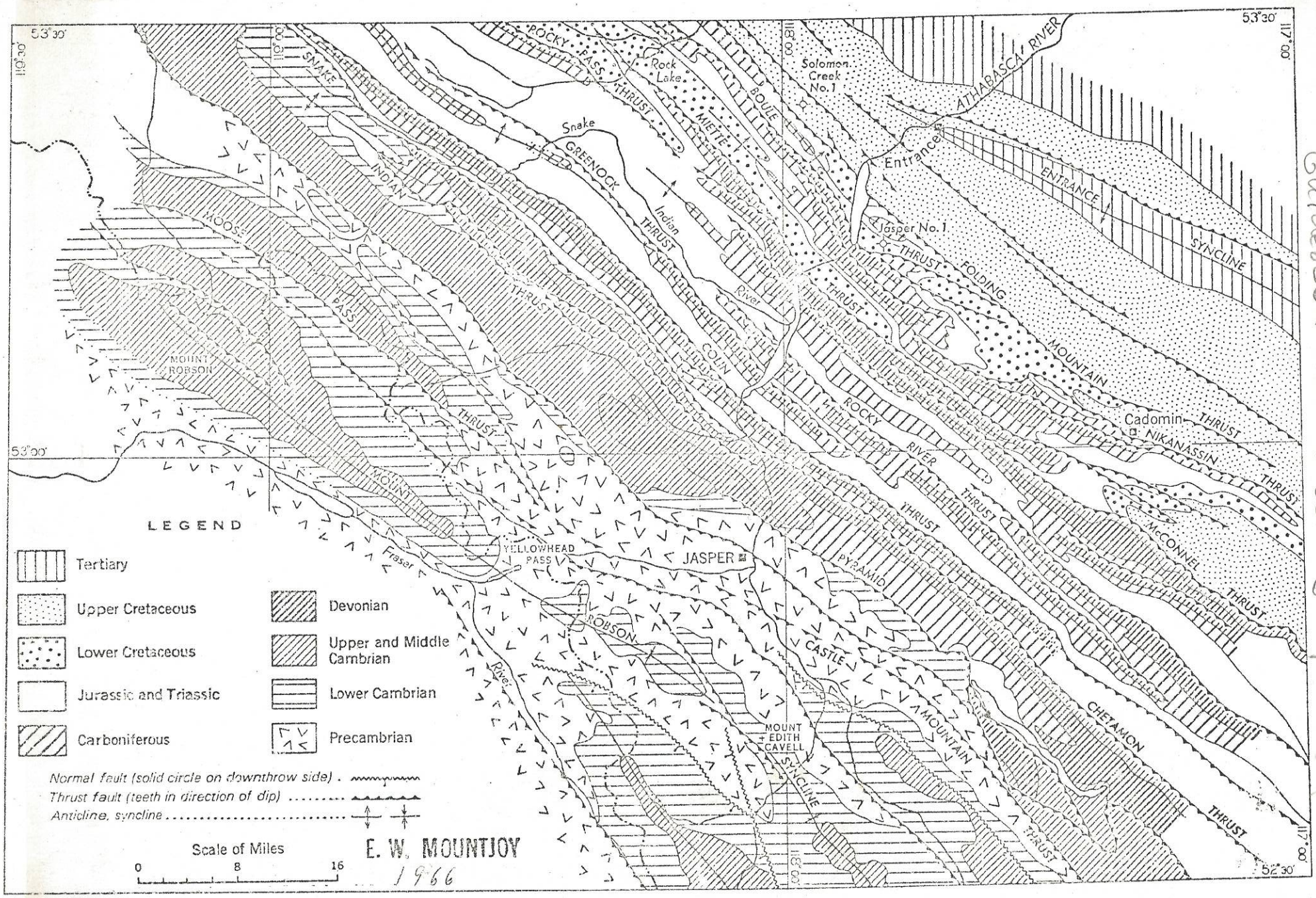


Guidebook CTG 83 Jasper

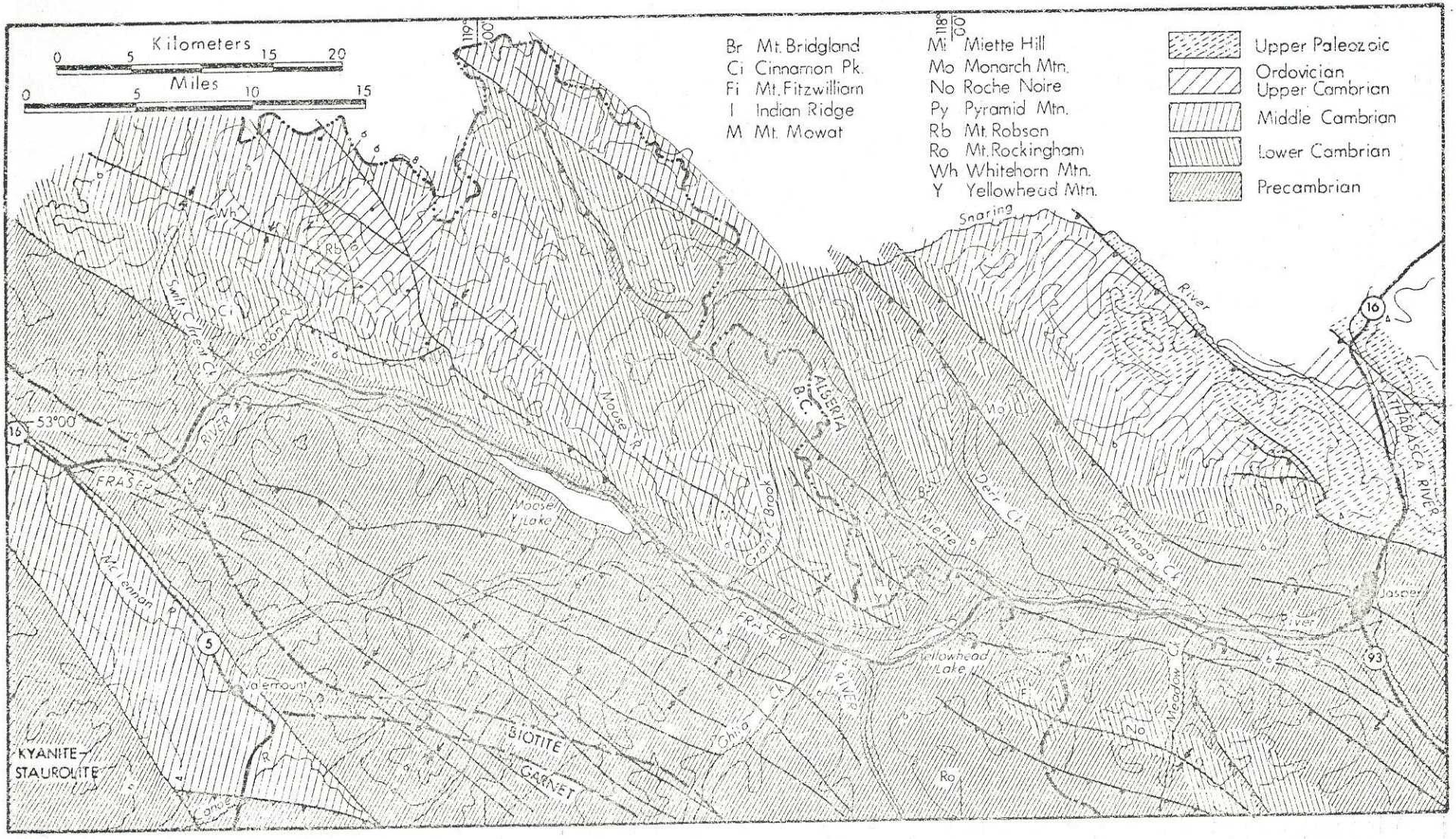


Fig. 4. Geological map of the Main Ranges west of Jasper (after Price and Mountjoy, 1970). Contours are in thousands of feet.

17.6 Gregg River.

19.8 Outcrop of gently dipping sandstones and shales belonging to the Cretaceous part of the Brazeau Group, near the axial region of a syncline northeast of the Seabolt anticline and southwest of the Entrance syncline. This fold continues to the southeast in the footwall of the Brazeau thrust.

21.3 Unknown (probably Teepee) Creek.

23.4 Teepee? (probably Wigwam) Creek. Steep northeasterly dipping sandstones belonging to the Cretaceous part of the Brazeau Group, in the southwestern limb of the Entrance syncline.

26.2 Outcrop of siltstones and sandstones belonging to the Paleocene part of the Brazeau Group, in the southwest limb of the Entrance syncline. High Divide Ridge, which is in the core of the Entrance syncline, lies to the northeast.

26.7 Wigwam? (probably Cold) Creek.

29.5 Cold Creek.

31.1 Outcrop of cobble-conglomerate, at or close to the boundary between the Cretaceous and Paleocene parts of the Brazeau Group, in the northeast limb of the Entrance syncline. Notice the cross-bedding suggestive of a southwesterly source. Entrance conglomerate (Jerzykiewicz & McLean, 1980 GSC Paper 79-2 says it is well below Cret.-Tert. boundary

31.8 Junction between Highways 16 and 738.

PART III (Hinton to Jasper)

Mileage

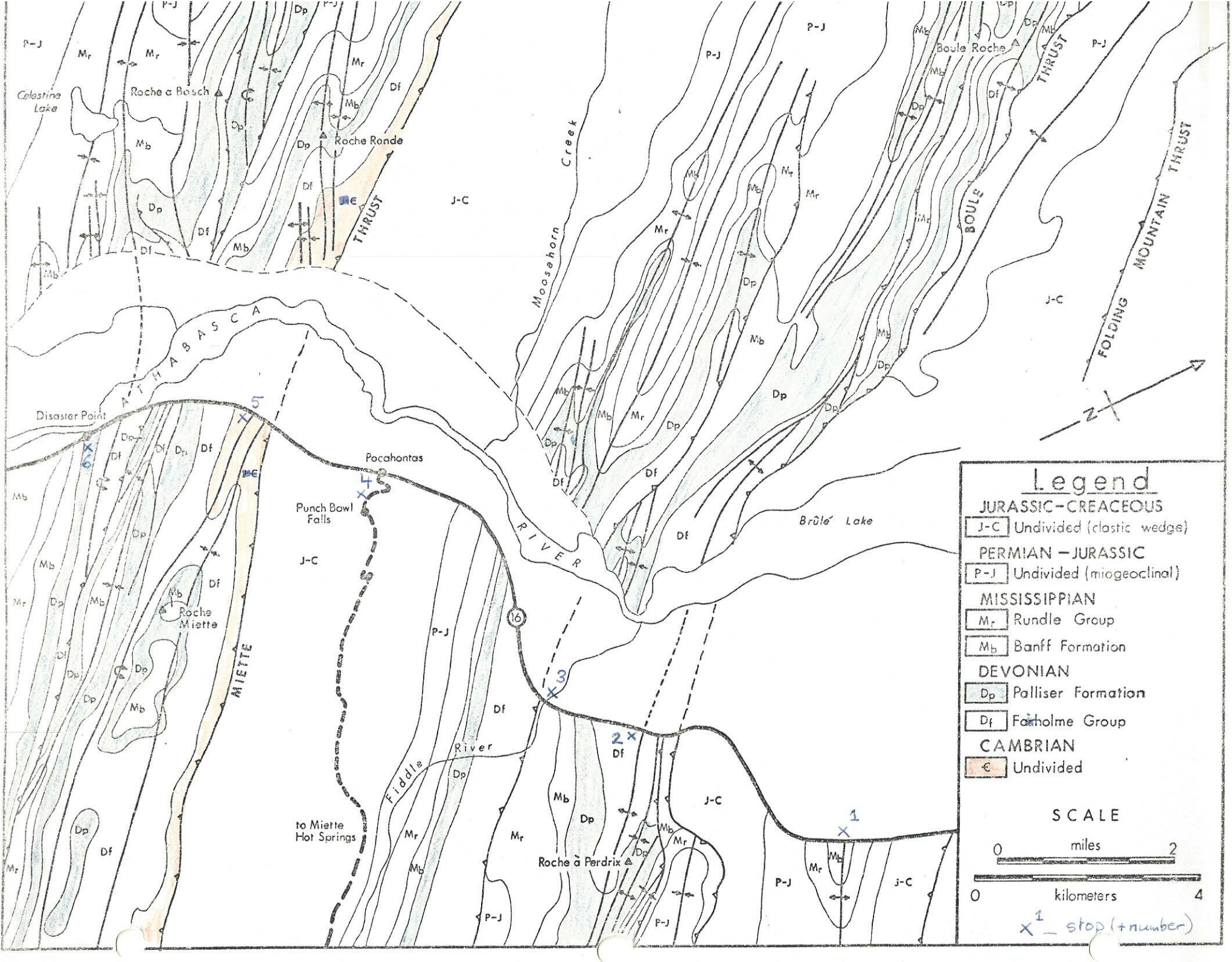
0.0 Hinton viewpoint (190 miles west of Edmonton). The topography north of the Athabasca River is partially controlled by lithologic layering in rocks of the Brazeau Group.

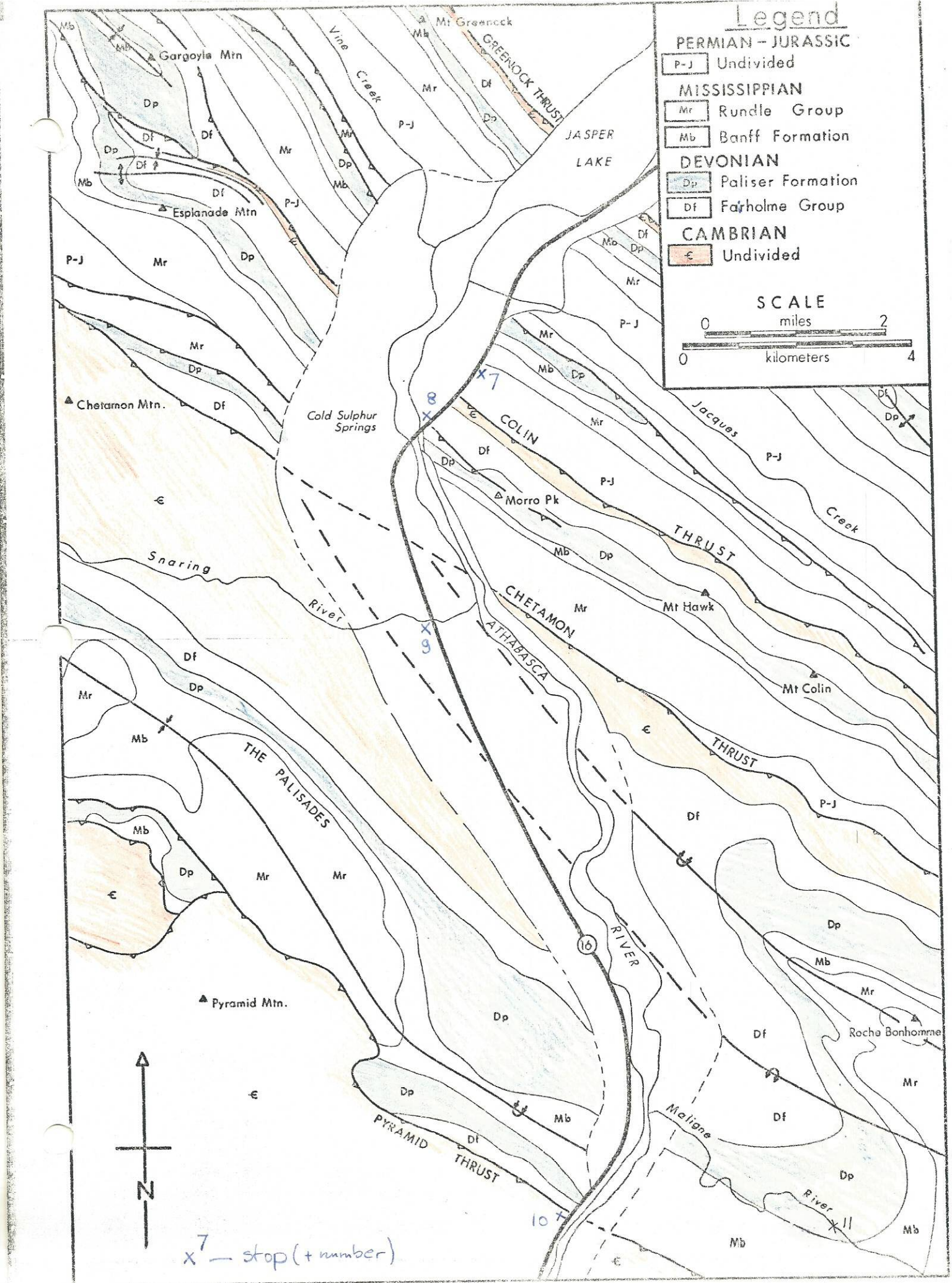
3.0 Approximate trace of the Pedley thrust which here forms the northeastern boundary of the Foothills

The Foothills along the Athabasca River lack the closely spaced imbricate thrust-sheets that characterize southern Alberta, and are divisible, from northeast to southwest, into the Entrance syncline, Seabolt anticline, Seabolt syncline and Folding Mountain thrust-sheet (Fig. 1).

3.7 Junction with Highway 738.

4.8 Junction with Highway 40. The axial trace of the Entrance syncline is about 0.3 miles to the southwest.


Celestine Lake
Roche a Bosch
Roche Ronde
THRUST
Moosehorn Creek
Boule Roche
BOULE
THRUST
FOLDING MOUNTAIN THRUST
ATHABASCA
Disaster Point
Pocahontas
Punch Bowl Falls
Roche Miette
MIETTE
Fiddle River
to Miette Hot Springs
Roche à Perdrix
Brûlé Lake
RIVER
16
N
Legend
JURASSIC-CREACEOUS
J-C Undivided (clastic wedge)
PERMIAN – JURASSIC
P-J Undivided (miogeoclinal)
MISSISSIPPIAN
Mr Rundle Group
Mb Banff Formation
DEVONIAN
Dp Palliser Formation
Df Fairholme Group
CAMBRIAN
€ Undivided
SCALE
0 miles 2
0 kilometers 4
x1 stop (+number)


Legend
PERMIAN – JURASSIC
P-J Undivided
MISSISSIPPIAN
Mr Rundle Group
Mb Banff Formation
DEVONIAN
Dp Paliser Formation
Df Fairholme Group
CAMBRIAN
€ Undivided
SCALE
0 miles 2
0 kilometers 4
Mt Greenock
GREENOCK THRUST
Vine Creek
Gargoyle Mtn
JASPER LAKE
Esplanade Mtn
Chetamon Mtn.
Cold Sulphur Springs
COLIN
Morro Pk
THRUST
Jacques Creek
Snaring River
CHETAMON
ATHABASCA
Mt Hawk
Mt Colin
THE PALISADES
Pyramid Mtn.
RIVER
PYRAMID THRUST
Maligne River
Roche Bonhomme
N
x7 — stop (+ number)

5.9 Bar F Ranch. For the next 1.7 miles the Brazeau Group crops out in the southwestern limb of the Entrance syncline.

8.6 Steeply dipping strata of the Brazeau Group crop out near the axial trace of the Seabolt anticline.

9.5 Approximate trace of the Seabolt syncline. For the next 1.5 miles the Brazeau and Alberta Groups crop out in the southwestern limb of the Seabolt syncline which is continuous with the Brazeau syncline to the southeast.

13.1 Approximate position of the trace of the Folding Mountain thrust. Strata in the hanging wall of this thrust have been folded into an anticline which may result from fault drag or from buckling of an early bending fold related to migration of the Folding Mountain thrust from one stratigraphic horizon to another.

15.1 Overlander Lodge.

16.0 Approximate surface trace of the Boule thrust that here marks the northeastern boundary of the Front Ranges.

The stratigraphic succession exposed in the Front Ranges along the Athabasca River can be summarized as follows:

Cretaceous	Blairmore Gp.	250'+	Ss sh coal
	Cadomin Fm.	ca 35'	Cgl
Jurassic	Nikanassin Fm.	ca 1500'	Ss sh
	Fernie Gp.	100'+	Sh
Triassic	Spray River Gp.	1800-2000'	sst ss sh carb
Permian	"Rocky Mountain" Gp.	0-150'	ch ss cgl
Carboniferous	Rundle Gp.	1000-1500'	carb sh
	Banff Gp.	600-750'	sh lst
	Palliser Fm.	750-900'	lst
	Fairholme Gp.	1300-2000'	carb sh
Camb. - Ord.	-	1400-6000'	carb sh ss

Although this northeasterly tapering, miogeoclinal and clastic-wedge succession resembles that of the classic Bow River section, there are some differences. The Middle Cambrian Cathedral carbonates are replaced by a shaly facies, as are those of the Fairholme Group; the Rundle and Rocky Mountain Groups are thinner; the Spray River Group is thicker and contains evaporites; the coal measures of the Upper Jurassic Kootenay Formation are replaced by brackish water clastics of the Nikanassin Formation; and the lower part of the Blairmore Group (Luscar Formation) contains coal measures.

The Front Ranges, like those along the Bow River, are divisible into several thrust-sheets. Along the Athabasca River these have ridden relatively northeast on the Boule, Miette, Greenock, Colin and Chetamon thrusts (Fig. 4). Although the overall dip of the thrust-sheets

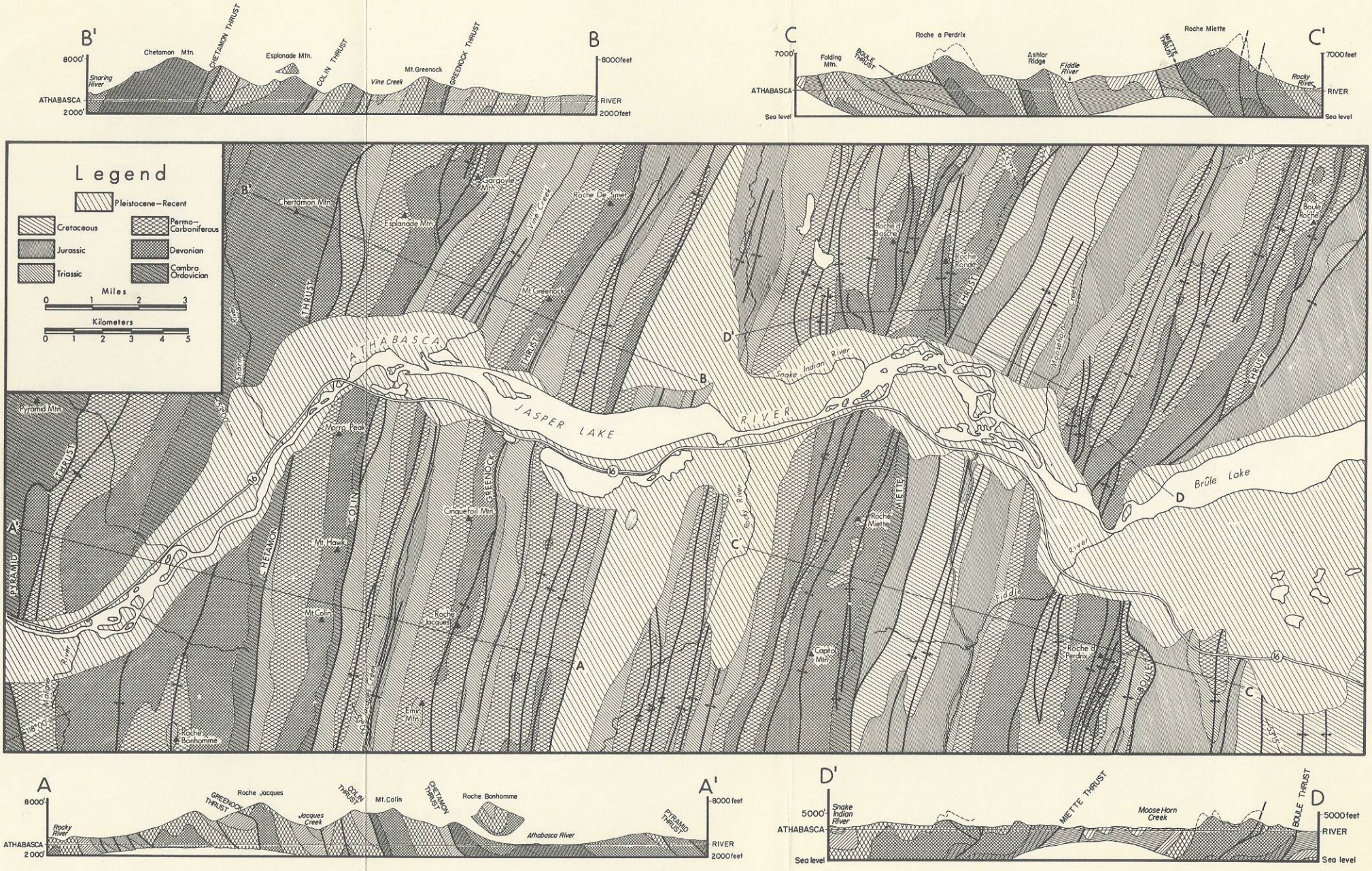


Fig. 27. Geology of the Front Ranges along the Athabasca River (H. A. K. Charlesworth, after Mountjoy, 1960 and O'Brien, 1960).

is southwesterly, the strata within them have experienced more folding than to the southeast.

The Boule thrust-sheet exposes rocks older than those cropping out to the northeast. The Devonian Fairholme Group and Palliser Formation are well displayed on Roche à Perdrix (Fig. 5), and the Carboniferous Banff Formation and Rundle Group in the Boule Range (Fig. 6) north of the Athabasca River.

There does not appear to have been much movement along the Boule, Perdrix, Mystery Lake and Nikanassin thrusts. The movement that has occurred followed considerable folding, as indicated by the relatively high average angle between these faults and bedding. Thus the Boule and Perdrix Ranges, north and south of the Athabasca River, as well as the Nikanassin Range, probably represent anticlinal uplifts within the Folding Mountain thrust-sheet rather than a separate thrust-sheet. The Boule thrust-sheet is generally included in the Front Ranges whereas its equivalent along strike, the Nikanassin thrust-sheet, is usually placed in the Foothills.

Rocks that crop out in the northeastern part of the Boule thrust-sheet contain several folds and thrusts, some of which can be seen from the bridge over the Fiddle River (mile 17.7) (Fig. 6) and from Pocahontas (Fig. 7). At Roche a Perdrix (mile 16.6) folding in Fairholme and Palliser strata is well displayed (Fig. 5). The relatively small-scale buckling at the top of the Fairholme Group beneath the competent Palliser Formation in the axial region of the prominent anticline is a characteristic adjustment feature of flexural-slip folds.

21.0 Pocahontas.

The Mesozoic rocks cropping out in the southwestern part of the Boule thrust-sheet are as structurally complex as the Paleozoics. At Punchbowl Falls, near the former coal-mining town of Pocahontas, sandstones, siltstones and coaly shales of the Nikanassin Formation are overlain by the Cadomin Conglomerate.

22.1 Approximate surface trace of Miette thrust.

The Miette thrust-sheet exposes rocks older than those cropping out to the northeast. The Cambrian and Devonian succession is well exposed on Roche Miette (Fig. 9). Both disharmonic and concentric folding is conspicuous in the northeastern part of the thrust-sheet (Figs. 8,10,14). The axial surfaces of these folds generally dip steeply northeast as do the various contraction faults: these anomalous dips probably resulted from rotation along deeper thrusts which emerge farther northeast. Mesoscopic fabric elements such as cleavage, cleavage-boudinage and bedding-plane striae are conspicuous at mile 25.0.

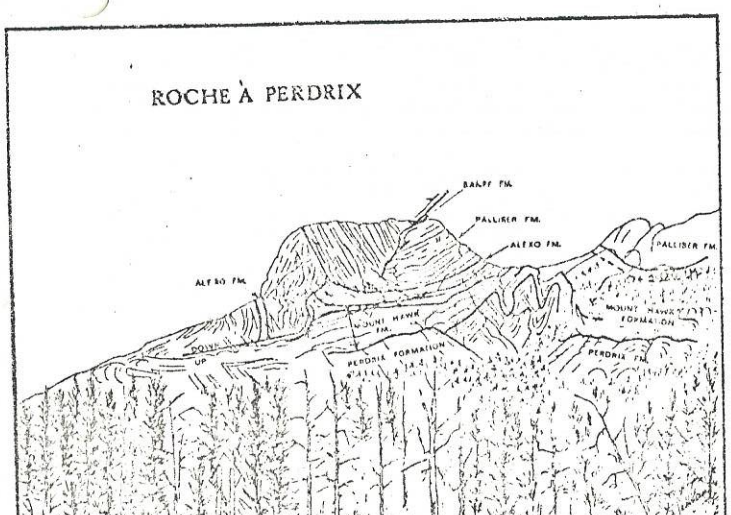


Fig. 5. Sketch of Roche à Perdrix from Highway 16 at the east entrance to Jasper National Park (R. A. Price with E. Fernando).

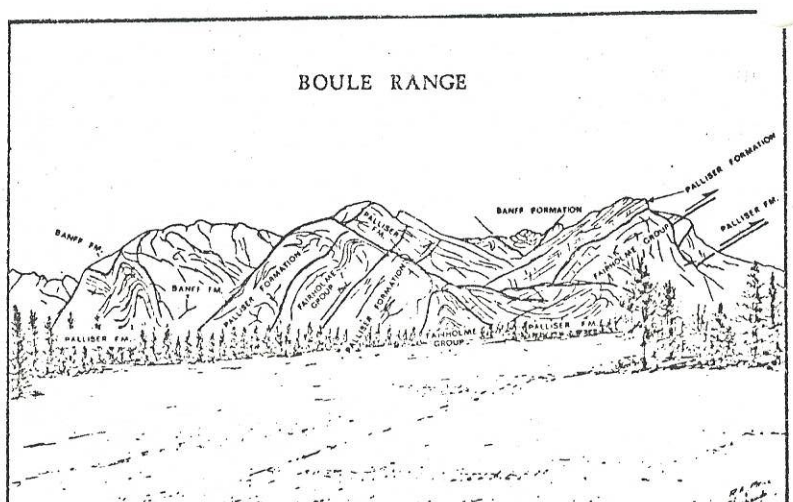


Fig. 6. Sketch of the south end of Boule Range from Highway 16 at the Fiddle River Bridge (R. A. Price with E. Fernando).

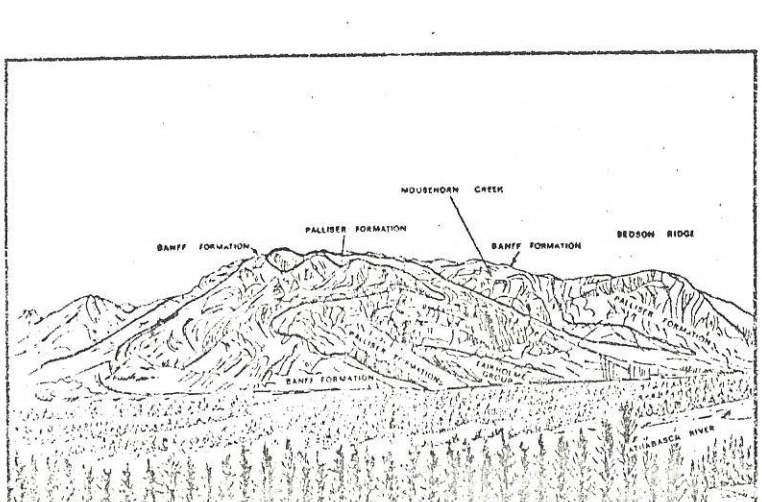


Fig. 7. Sketch of southwesterly overfolds in Boule Thrust sheet at Mooschorn Creek from near Pocahontas (R. A. Price with E. Fernando).

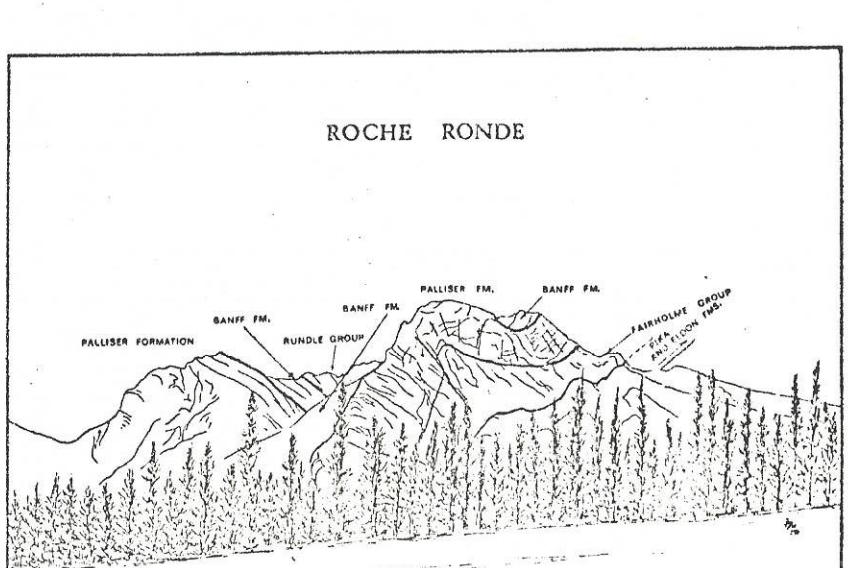


Fig. 8. Sketch of Roche Ronde from Highway 16 at Roche Miette (R. A. Price with E. Fernando).

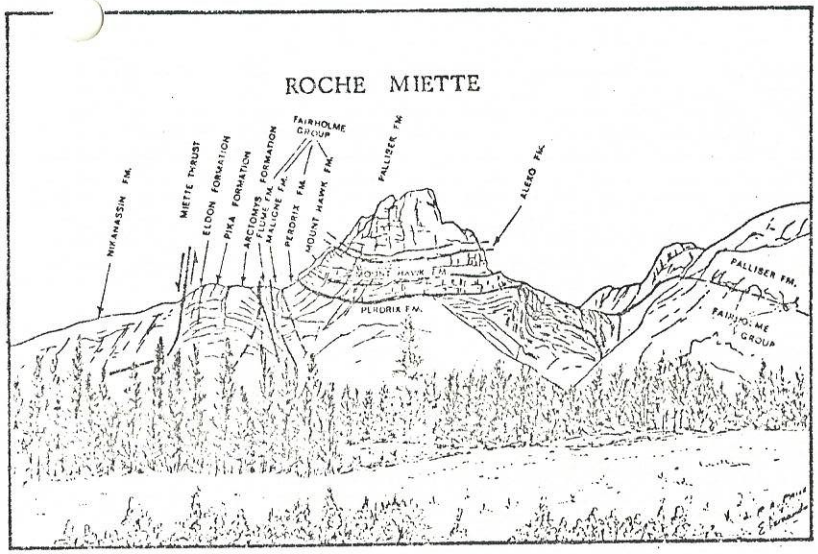


Fig. 9. Sketch of Roche Miette from Highway 16 (R. A. Price with E. Fernando).

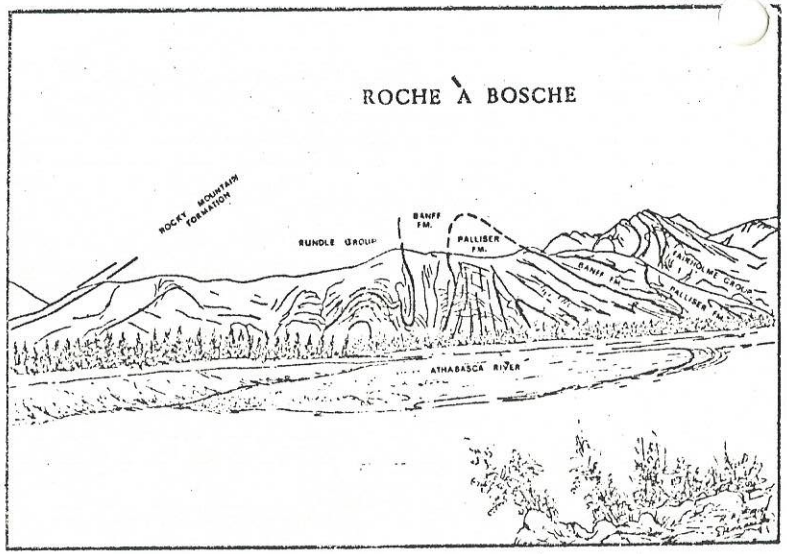


Fig. 10. Sketch of Roche à Bosche from Highway 16 at the Rocky River (R. A. Price with E. Fernando).

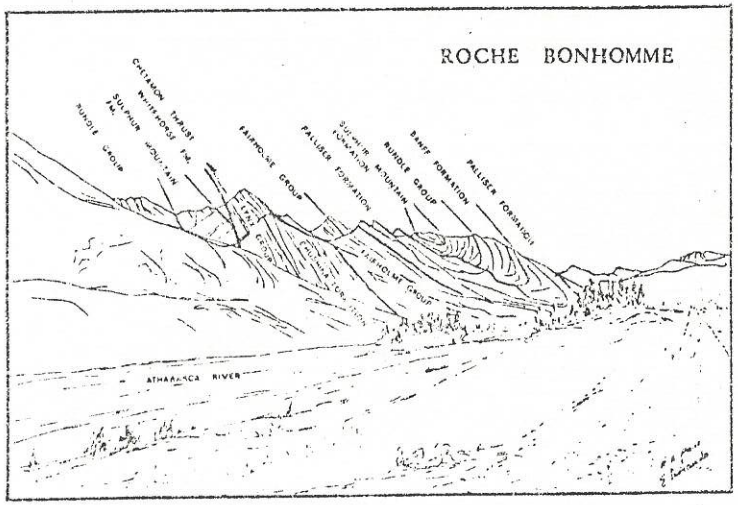


Fig. 11. Sketch of Roche Bonhomme from Highway 16 at the Snaring River bridge (R. A. Price with E. Fernando).

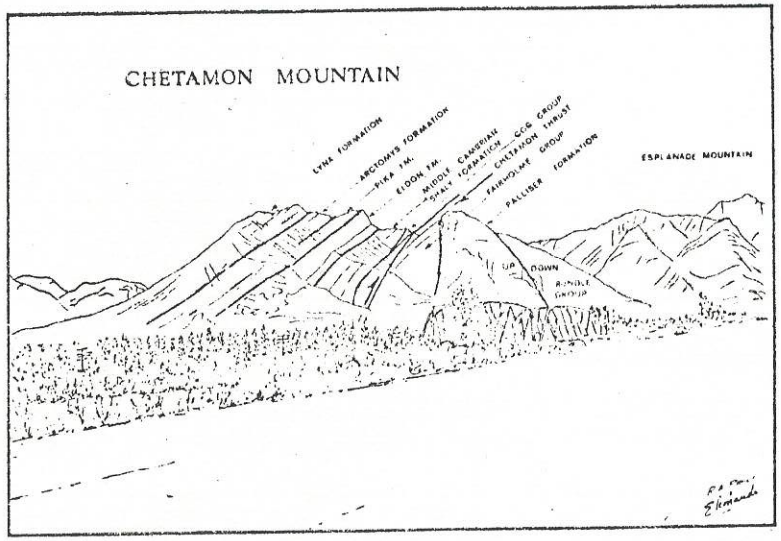


Fig. 12. Sketch of Chetamon Mountain from Highway 16 at the Snaring River bridge (R. A. Price with E. Fernando).

26.4 Bridge over main branch of the Rocky River.

31.5 Approximate trace of the Greenock thrust.

The structure of the Greenock thrust-sheet is essentially homoclinal, with some minor imbrications in the south-western part (Fig.13). An interesting section belonging to the "Rocky Mountain" Group is exposed at mile 33.9.

34.2 Approximate trace of the Colin thrust.

Southeast of the Athabasca River the Colin thrust-sheet is essentially homoclinal. To the northwest, however, it is divisible into three major panels. Whereas the south-western panel is structurally complex and poorly exposed, the remaining two are structurally simple and well displayed on Espanade and Gargoyle Mountains (Fig. 13). At Cold Sulphur Springs there is a good road section with Palliser limestones (at the bridge over the Athabasca River) underlain by 650 feet of silty and argillaceous limestones and calcareous siltstones of the Alexo Formation. Following a covered interval underlain partly by the 200 foot thick Mount Hawk Limestone, the shales and argillaceous limestones of the 350 foot thick Perdrix Formation are underlain by 50 feet of thinly bedded argillaceous limestones and 150 feet of dolomites and cherty dolomites of the Maligne and Flume Formations, respectively. These in turn rest on Cambrian Carbonates.

36.3 Approximate trace of the Chetamon thrust.

From the bridge over the Snaring River (mile 37.2) the structure of the thrust-sheet west of the Athabasca River can be seen to be homoclinal, the Chetamon Mountain section (Gog Group to Lynx Formation (Fig. 12) being structurally continuous with that in the Pallisades (Lynx to Banff Formations). East of the river (Fig. 1) the Lynx strata immediately overlying the Chetamon thrust are some 5000 feet higher than the oldest rocks above the thrust to the west, and the structure of the thrust-sheet is dominated by an anticline-syncline pair whose northeasterly dipping segment probably overlies that part of the thrust where the missing 5000 feet of strata are truncated. The folds, which became tighter during the period of movement of the fault and are now essentially concentric buckle-folds, originated as bending folds related to upwards migration of the initial thrust from a stratigraphic horizon at the top of the Gog Group to one in the Lynx Formation.

The Paleozoic succession in the Chetamon thrust-sheet is over 11,000 feet thick, more than in the other thrust-sheets of the Front Ranges.

44.1 Approximate trace of the Pyramid thrust which here forms the northeastern boundary of the Main Ranges.

R E F E R E N C E S

BAILY A.W., GORDY P.L. and STEWART S.A., 1966.-Structure, seismic data, and orogenic evolution of southern Canadian Rocky Mountains. Bull. Canadian Petroleum Geol. 14,1 37-81.

BEST E.W., 1958, The Triassic of the North Saskatchewan-Athabasca Rivers Area; Alberta Soc. Petrol. Geol., 5th Ann. Field Conf. Guidebook, p. 39-49.

DAHLSTROM C.D.A., 1969.-The upper detachment in concentric folding. Bull. Canadian Petroleum Geol. 17, 326-46.

DAHLSTROM C.D.A., 1970.-Structure geology in the eastern margin of the Canadian Rocky Mountains.
Bull. Canadian Petroleum Geology. 18, 332-406.

FREBOLD H., 1957, The Jurassic Fernie Group in the Canadian Rocky Mountains and Foothills; Geol. Surv. Canada Memoir 287.

FREBOLD H., 1962, The Devonian-Jurassic Contact and the Subdivision of the Fernie Group in the Banff Area, Alberta; Geol. Surv. Canada, Paper 62-3.

IRISH E.W.J., 1965. Geology of the Rocky Mountain Foothills, Alberta (between latitudes 53°15' and 54°15'). Geol. Surv. Canada Mem. 334.

MacQUEEN R.W., 1966, Mississippian Stratigraphy and Sedimentology at Cadomin, Alberta; Edmonton Geol. Soc., 8th Ann. Field Trip Guidebook, p. 39-60.

McKAY B.R., 1929, Mountain Park (map 208A), Cadomin (map 208B); Geol. Surv. Canada.

Mackenzie, W.S, 1969 - Stratigraphy of the Devonian Southesk Cairn carbonate complex and associated strata, E. Jasper Nat. Park, Geol. Surv. Can. Bulletin 184.

MELLON G.B., 1966, Lower Cretaceous Section, Cadomin Area, Alberta; Edmonton Geol. Soc. 8th Annual Field Trip, Guidebook, p. 67-80.

MOUNTJOY E.W., 1960, Miette, Alberta; Geol. Surv. Canada, Map 40-1959.

MOUNTJOY E.W., 1961, Rocky Mountain Front Ranges along the Athabasca Valley; Edmonton Geol. Soc. 3rd Ann. Field Trip Guidebook, p. 14-42.

O'BRIEN C.A.E., 1960, The Structural Geology of the Boule and Bosche Ranges in the Canadian Rocky Mountains; Geol. Soc. London, Quart. Jour., v.116, p. 409-436.

PRICE R.A., MOUNTJOY E.W., 1970.-Geologic structure of the Canadian Rocky Mountains between Bow and Athabasca Rivers - a progress report. 7-26, In Wheeler J.O. (Ed.). Structure of the Southern Canadian Cordillera. Geol. Assoc. Canada. Spec. Pap. 6, 166p.

PRICE R.A., et al., 1972. The Canadian Rockies and tectonic evolution of the Southeastern Cordillera. Int. Geol. Cong. Field Excursion A15-C15. pp. 129.

STOTT D.F., 1968, Cretaceous Alberta Group in the Region of McLeod River, Alberta; Edmonton Geol. Soc. 8th Ann. Field Trip Guidebook, p. ~~39-60~~ 81-99.

Mississippian faunas of Western Canada (by S.T. Nelson)
Geol. Ass. of Canada Special Paper no.2 (1961)

D.W. Gibson (1968) - Triassic stratigraphy between Athabasca and Brazeau rivers, Alberta. Geol. Surv. Can. Paper 68-11
(Cadomin section along railroad)